REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 2-4, 6-8 and 10-17 are pending in the present application. Claims 1, 5, and 9 are cancelled without prejudice, claims 2-4, 13 and 14 are amended and new claims 15-17 are added by the present amendment.

I. Rejections Under 35 U.S.C. §§102 and 103

Claims 1-3, 5-7, 13 and 14 were rejected under 35 U.S.C. § 102(a) as unpatentable over *From Few to Many: Generative Models for Recognition Under Variable Pose and Illumination* to Georghiades et al. (herein "Georghiades"), and claims 4 and 8 were rejected under 35 U.S.C. §103(a) as unpatentable over Georghiades and U.S. Patent No. 5,715,325 to Bang et al. (herein "Bang"). These rejections are respectfully traversed.

Claim 1 is cancelled and claim 4 is rewritten in independent form including the features of cancelled claim 1. Further, amended independent claim 4 recites "identifying a partial space in which a vector having a pixel value of the small region as an element is varied," support for which is found in the originally filed specification at least at page 11, lines 22-24. Amended independent claims 13 and 14 recite similar features.

As an advantage, in a non-limiting example, each window may be modeled by identifying a partial space, in which a vector having a pixel value $I(x_1)$ of a window as an element is varied, for example, in the case where illumination conditions are varied or the relative relationship between a region Q and a camera position on an object surface corresponding to a window is varied. Therefore, even when a part of an object (for example, a face) is hidden, the object can be recognized (see the specification at least at page 5, line 28 to page 6, line 1).

In contrast, as acknowledged in the outstanding Office Action in item 4 at page 4, Georghiades does not discuss selecting a characteristic small region in an object to be a recognition target. Moreover, Georghiades only discusses generating synthetic images using a few images of an object in a fixed pose, but does not discuss or suggest "identifying a partial space in which a vector having a pixel value of a small region as an element is varied," as recited in amended independent claims 4, 13, and 14.

Also, Bang only discusses a detection system which determines the most likely position of a face by identifying a top, bottom and sides of a possible head region to define a bounding box, but also does not discuss or suggest "identifying a partial space in which a vector having a pixel value of a small region as an element is varied," as recited in amended independent claims 4, 13 and 14.

Accordingly, it is respectfully submitted amended independent claims 4, 13 and 14 and each of the claims depending therefrom patentably distinguish over Georghiades and Bang.

Moreover, it is respectfully submitted Georghiades and Bang cannot be combined in the manner suggested in the outstanding Office Action because Georghiades teaches away from Bang.

The introduction of Georghiades recites "there is a long tradition of performing edge detection at an early stage since the presence of an edge and image location is thought to be largely independent of lighting. It has been observed, however, that methods for face recognition based on finding local image features and using their geometric relation are generally ineffective [4]." Therefore, Georghiades expressly teaches away from performing edge detection to find local image features.

In contrast, Bang at col. 4, lines 5-19, discusses comparing an x-gradient normalized block image data 28 to an expected background image data 30, which is a method of performing edge detection. Accordingly, it is respectfully submitted Georghiades teaches away from Bang, and that this rejection be withdrawn.

Claims 1, 2, 4, 9, 10, and 12-14 were rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 5,828,769 to Burns (herein "Burns") and *A Low-Dimensional Representation of Human Faces for Arbitrary Lighting Conditions* to Hallinan (herein "Hallinan"). This rejection is respectfully traversed.

Burns at col. 1, lines 17-20, only discusses initial recognition of an object under arbitrary variations of three-dimensional position and orientation of the object by encoding patches of a captured model image and comparing the captured image patches to stored image patches to stored image patches from a data base. However, Burns does not discuss or suggest at least "identifying a partial space in which a vector having a pixel value of the small region has an element varies," as recited in amended independent claims 4, 13 and 14. Rather, Burns only discusses the pose of an object, which is different from identifying a partial space, as recited in amended independent claims 4, 13 and 14.

Further, as acknowledged at page 6 of the outstanding Office Action, Burns does not discuss estimating variations in appearance of an object caused by variations in illumination. Also, Hallinan only discusses recognizing a fixed object from a fixed viewpoint without making assumptions about a surface's geometry or bi-directional reflectance function, but does not discuss or suggest the features of amended independent claims 4, 13 and 14.

Further, it is respectfully submitted, Burns teaches away from Hallinan because Burns discusses varying a pose of an object in Figs. 4A-4C and Fig. 5, while Hallinan discusses "recognizing a fixed object from a fixed viewpoint." Accordingly, it is respectfully submitted Burns and Hallinan cannot be combined in the manner suggested in the outstanding Office Action.

Claims 3 and 11 were rejected under 35 U.S.C. §103(a) as unpatentable over Burns, Hallinan and Bang. This rejection is respectfully traversed.

Claims 3 and 11 depend on amended independent claim 4, which as discussed, is believed to patentably distinguish over Burns, Hallinan and Bang. Further, it is respectfully submitted Burns and Hallinan cannot be combined in the manner suggested in the outstanding Office Action, as discussed above. Accordingly, it is respectfully submitted claims 3 and 11 also patentably distinguish over Burns, Hallinan and Bang at least for similar reasons as discussed above.

II. Amendment to the Claims, Specification and Drawings

In addition, claims 2 and 3 are amended to depend on claim 4 rather than cancelled claim 1, and claims 4, 13 and 14 are amended to better conform to standard claim drafting practice. Also, the specification and Figs. 1, 3 and 5 are amended only to correct minor informalities. It is believed no new matter is added.

III. New Claims

In addition, new claims 15-17 are added to set forth the invention in a varying scope. Support for new claims 15-17, which depend on amended independent claims 4, 13 and 14, respectively, is found in the originally filed specification at least at page 11, lines 22-31. It is believed no new matter is added.

IV. Conclusion

Consequently, in light of the above discussion and in view of the present amendment, this application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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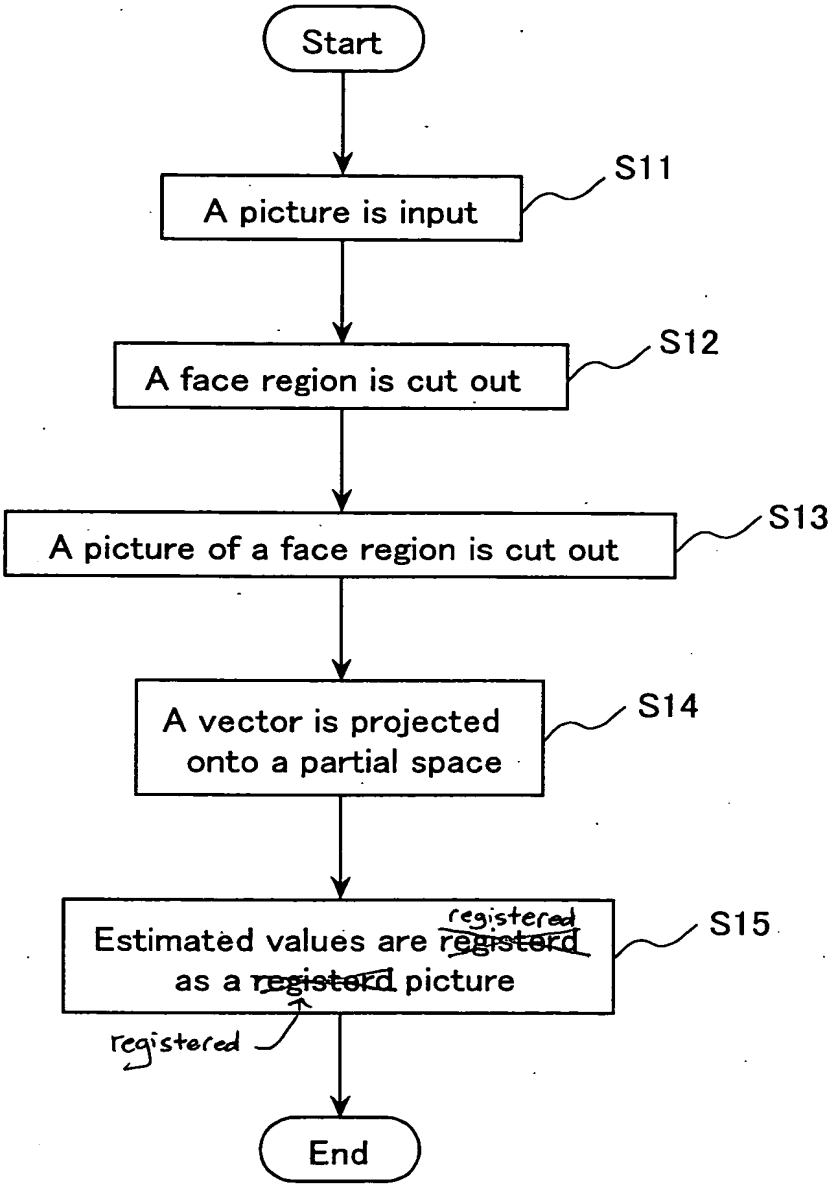

FIG. 1

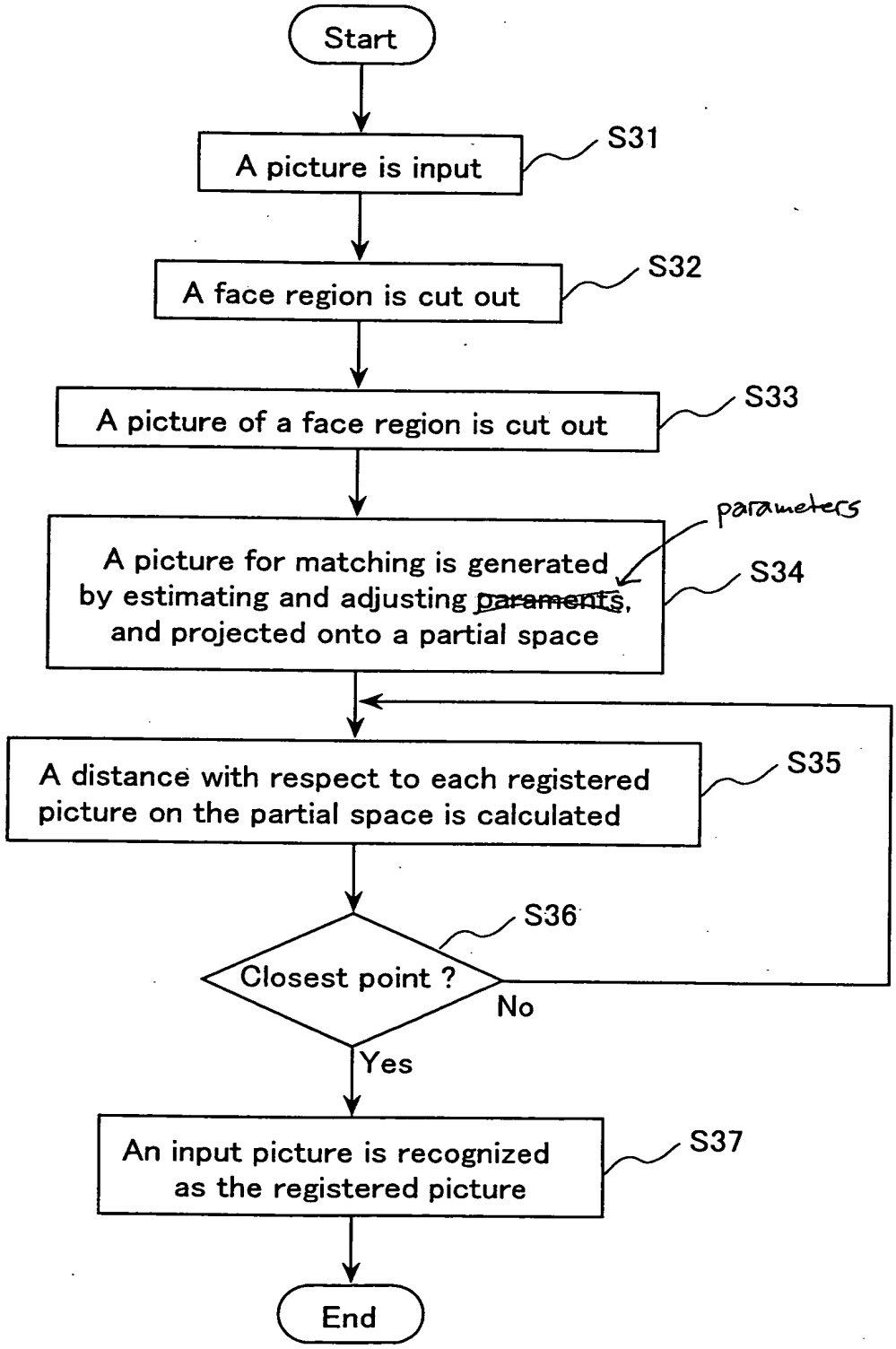

FIG. 3

ANNOTATED SHEET

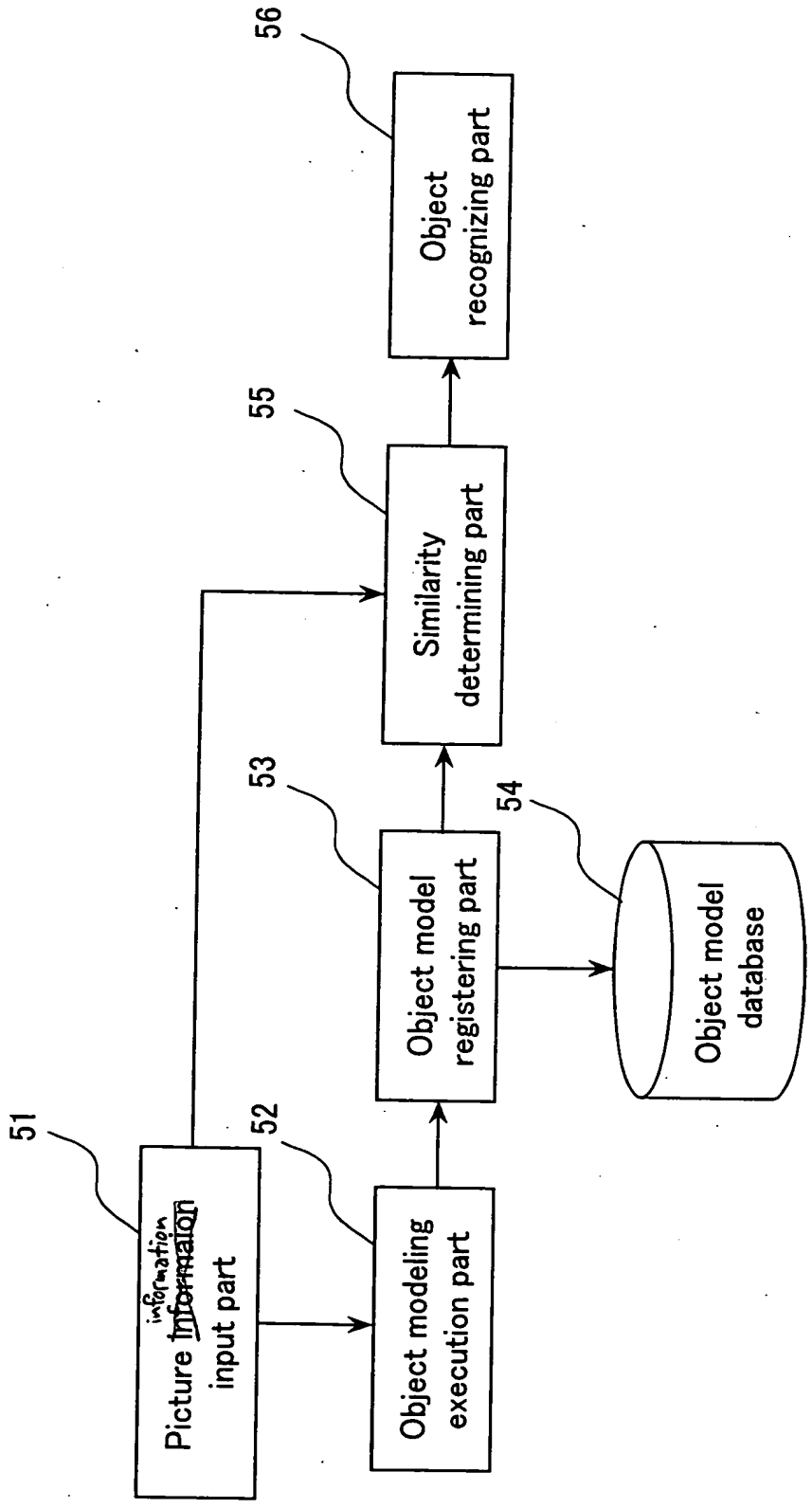

FIG. 5